

Claims

- sub
B5
1. A microwave circuit package comprising:
a plurality of fluoropolymer composite substrate layers defining levels and having surfaces;
a plurality of metal layers disposed on said surfaces of plurality of substrate layers;
a plurality of groundplanes comprising a first subset of said plurality of metal layers connected by a first plurality of conductors; and
at least one coupler comprising a plurality of coupling lines, wherein said coupler has a substantially spiral-like shape.
 2. The microwave circuit of claim 1, wherein said spiral-like shape is substantially circular.
 3. The microwave circuit of claim 1, wherein said spiral-like shape is substantially rectangular.
 4. The microwave circuit of claim 1, wherein said spiral-like shape is substantially oval.
 5. The microwave circuit of claim 1, wherein said spiral-like shape is substantially circular.
 6. The microwave circuit of claim 1, wherein said plurality of coupling lines are substantially co-planar.

sub
B6

7. The microwave circuit of claim 1, wherein said plurality of coupling lines are distributed across a plurality of planes.

8. The microwave circuit of claim 1, wherein said plurality of coupling lines is at least three coupling lines.

9. The microwave circuit of claim 1, wherein said plurality of fluoropolymer composite substrate layers are fusion bonded into a homogeneous dielectric structure.

sub
B7

10. The microwave circuit of claim 9, wherein at least one of said plurality of fluoropolymer composite substrate layers is adhered to ceramic.

11. The microwave circuit of claim 9, wherein said homogeneous dielectric structure has embedded active elements.

sub
aid

12. A method of manufacturing a coupler having a substantially spiral-like shape, comprising the steps of:

manufacturing a plurality of fluoropolymer composite substrate layers,

etching at least one metal layer disposed on at least a subset of said plurality of substrate layers, wherein said at least one metal layer comprises a plurality of coupling lines.

13. The method of manufacturing a coupler having a spiral-like shape of claim 12, wherein said spiral-like shape is substantially circular.

14. The method of manufacturing a coupler having a spiral-like shape of claim 12, wherein said spiral-like shape is substantially rectangular.

15. The method of manufacturing a coupler having a spiral-like shape of claim 12, wherein said spiral-like shape is substantially oval.

16. The method of manufacturing a coupler having a spiral-like shape of claim 12, wherein said spiral-like shape is substantially circular.

17. The method of manufacturing a coupler having a spiral-like shape of claim 12, wherein said at least one metal layer is exactly one metal layer.

18. The method of manufacturing a coupler having a spiral-like shape of claim 12, wherein said at least one metal layer is a plurality of metal layers and wherein said plurality of coupling lines is distributed among at least two of said plurality of metal layers.

19. The method of manufacturing a coupler having a spiral-like shape of claim 12, wherein said plurality of coupling lines is at least three coupling lines.

20. The method of manufacturing a coupler having a spiral-like shape of claim 12, wherein said plurality of

fluoropolymer composite substrate layers are fusion bonded into a homogeneous dielectric structure.

21. The method of manufacturing a coupler having a spiral-like shape of claim 20, wherein at least one of said plurality of fluoropolymer composite substrate layers is adhered to ceramic.

22. The method of manufacturing a coupler having a spiral-like shape of claim 20, wherein said homogeneous dielectric structure has embedded active elements.

23. A microwave circuit comprising:

fluoropolymer composite substrate means for defining levels and surfaces;

metal layer means disposed on said surfaces to define a plurality of conducting layers;

grounding means comprising a first subset of said plurality of conducting layers; and

coupling lines means for forming a coupler having a substantially spiral-like shape.

24. The microwave circuit of claim 23, wherein said spiral-like shape is substantially circular.

25. The microwave circuit of claim 23, wherein said spiral-like shape is substantially rectangular.

